

### **Section III. REMARKS**

#### **Response to the Objection of Drawings**

In the July 14, 2004 Office Action, the Examiner raised objection to the drawings and required correction thereof by changing the reference numeral 76 of Figure 4 to 70.

After review Figure 4 and the specification as originally filed, Applicants hereby confirm that Figure 4 is correct and that the specification contains a typographic error on page 20, line 14, i.e., the Cu or Al electrodes should be 76 and 78, instead of 70 and 78.

Corresponding correction has been made to the specification, as set out in Section I (2) hereinabove.

#### **Response to the §112 Rejections of Claims 1-39**

In the July 14, 2004 Office Action, the Examiner rejected claims 1-39 under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement. Specifically, the Examiner objected to the limitation that "said material of said at least one metal layer is Al, said at least one material of said conductive barrier layer is not Ir or IrO<sub>2</sub>" as contained in claim 1, on the basis that such limitation is not supported by the original disclosure of the present application.

In response, Applicants have hereby deleted such limitation from claim 1, which are now in compliance with the written description requirement of 35 U.S.C. §112, first paragraph.

#### **Rejection of Claims on Reference Grounds, and Traversal Thereof**

In the July 14, 2004 Office Action, the Examiner rejected claims 1-26 and 28-39 on new references grounds. Specifically, the Examiner rejected:

claims 1, 2, and 4 under 35 U.S.C. §102(b) as being anticipated by Weng et al. U.S. Patent No. 5,985,731 (hereafter "Weng");

claims 1-9, 11-12, 14, 16-18, 20-21, and 28-39 under 35 U.S.C. §102(e) as being anticipated by Kirlin et al. U.S. Patent No. 6,320,213 (hereinafter "Kirlin");

claims 1-3, 6-19, 20-26, and 32-39 under 35 U.S.C. §102(e) as being anticipated by Tang et al. U.S. Patent No. 6,462,931 (hereinafter "Tang");

claims 1-3, 6-9, 11-18, 23, and 25 under 35 U.S.C. §102(e) as being anticipated by Crenshaw et al. U.S. Patent No. 6,171,898 (hereinafter "Crenshaw"); and

claims 6-10 under 35 U.S.C. §103(a) as being obvious over Weng;

claim 10 under 35 U.S.C. §103(a) as being obvious over Kirlin; and

claims 4-5 under 35 U.S.C. §103(a) as being obvious over Tang in view of Summerfelt et al. U.S. 6,593,638 (hereinafter "Summerfelt").

In response, Applicants have hereby amended claim 1, from which claims 2-26 and 28-39 depend, to further require that the at least one layer of high dielectric constant material comprise "amorphous dielectric metal oxide having: (i) a voltage independent capacitance, (ii) a capacitance density of from about 1000 to about 10,000 nF/cm<sup>2</sup>, and (iii) a current leakage of <10<sup>-7</sup> A/cm<sup>2</sup>."

On page 7, lines 16-19 of the instant specification as originally filed, it was provided that:

"Other materials useful for the practice of the present invention are more fully disclosed and claimed in United States Patent Application Serial No. 09/469,700, filed December 22, 1999, in the name of Bryan C. Hendrix, for 'Low Temperature Process for High Density Thin Film Integrated Capacitors, and Amorphously Frustrated Ferroelectric Materials Therefor,' *the disclosure of which hereby is incorporated herein by reference in its entirety.*"

On page 13, lines 10-13 of the instant specification as originally filed, it was stated that:

"The disclosure of United States Patent Application No. 09/469,700, filed December 22, 1999, in the name of Bryan C. Hendrix, for "Low Temperature Process for High Density Thin Film Integrated Capacitors, and Amorphously Frustrated Ferroelectric Materials Therefor," is *hereby incorporated herein by reference in its entirety...*"

Therefore, Applicants have further amended the instant specification, by actually incorporating parts of U.S. Patent No. 6,348,705 that was issued on the basis of U.S. Patent Application No. 09/469,700.<sup>1</sup> A marked-up copy of U.S. Patent No. 6,348,705 showing the specific parts that have been actually incorporated into the instant specification is enclosed herewith for the Examiner's record.

The incorporation-by-reference of U.S. Patent Application No. 09/469,700 and the actual incorporation of parts of such U.S. patent application therefore provide sufficient support for the added requirement for "amorphous dielectric metal oxide having: (i) a voltage independent capacitance, (ii) a capacitance density of from about 1000 to about 10,000 nF/cm<sup>2</sup>, and (iii) a current leakage of <10<sup>-7</sup> A/cm<sup>2</sup>" as recited in the amended claim 1 of the present application.

None of the cited references teaches or suggests use of such amorphous dielectric metal oxide for constructing the high dielectric constant material layer, as required by claims 1-26 and 28-39 of the present application.

Specifically, the Weng reference is completely silent about the crystalline characteristics, i.e., single crystalline, polycrystalline, or amorphous, of the dielectric metal oxide layers disclosed therein.

Kirlin discloses high dielectric constant materials that are perovskites, i.e., which are known to be orthorhombic or pseudocubic crystals (see Kirlin, column 5, lines 54-58), not amorphous structures.

Further, Kirlin expressly discloses that "the layer of high dielectric constant material 112 is deposited by metal-organic chemical vapor deposition (MOCVD) of the material at a temperature of 650°C in 1 Torr of oxygen for three minutes" (see Kirlin, column 5, lines 65-67 and column 6, lines 1-2). According to the disclosure in U.S. Patent No. 6,348,705, the amorphous dielectric metal oxide film is formed when deposited and subsequently processed at a temperature below about 500°C (see column 6, lines 32-35 of the patent). It is therefore clear that the high dielectric constant material 112 of Kirlin, which was deposited at deposition temperature as high as 650°C, is not amorphous in structure.

<sup>1</sup> Please note that U.S. Patent Application No. 09/469,700 was co-pending with the present application at the time when the present application was filed, and it was subsequently issued as U.S. Patent No. 6,438,705 to Advanced Technology Materials, Inc., who is also the owner and assignee of the present application. It is clear that U.S. Patent No. 6,438,705 qualifies as a prior art reference only under 35 U.S.C. §102(e), and that the subject matter of such U.S. patent and the present patent application were, at the time the present invention was made, owned by the same person or subject to an obligation of assignment to the same person. Therefore, U.S. Patent No. 6,438,705 cannot be used to establish *prima facie* case of obviousness against the claimed invention of the present application, according to the provisions of 35 U.S.C. §103(c).

The Tang reference discloses the perovskite crystals of either BaTiO<sub>3</sub> (see Tang, column 3, lines 27-29, disclosing that BaTiO<sub>3</sub> has a “face-centered cubic perovskite crystal structure with Ti at the cell center, O at the face centers, and Ba at each corner”) or barium strontium titanate (BST) (see Tang, column 7, lines 48-51, stating that “the same results should apply to the dielectric being (Ba,Sr)TiO<sub>3</sub> because the substitution of Sr for some of the Ba should not change the inter face metal atoms being over the O sites”).

Further, Tang discloses that the BST layer 215 was deposited by “sputtering or MOCVD and followed by annealing in an oxygen or nitrogen or atmosphere at temperatures roughly in the range of 600-800°C.” As mentioned hereinabove, the amorphous dielectric metal oxide film is formed when deposited and subsequently processed at a temperature below about 500°C (see column 6, lines 32-35 of U.S. Patent No. 6,348,705). It is therefore clear that BST layer 215 of Tang, which was annealed at temperature as high as 600-800°C, is not amorphous in structure.

Crenshaw discloses high dielectric constant materials of perovskite structures that are deposited at high temperatures, i.e., generally greater than 500°C (see Crenshaw, column 1, lines 31-31-37). Therefore, it is clear that Crenshaw does not provide any derivative basis for amorphous dielectric metal oxide, as required by claims 1-26 and 28-39 of the present application.

The Summerfelt reference only discloses high dielectric constant materials of perovskite structures that are deposited at high temperatures, i.e., generally greater than 500°C (see Summerfelt, column 1, lines 32-34 and 46-50). Therefore, like Crenshaw, Summerfelt also fails to provide any derivative basis for amorphous dielectric metal oxide, as required by claims 1-26 and 28-39 of the present application.

Based on the foregoing, claims 1-26 and 28-39 of the present application patentably distinguish over all cited references, and the Examiner is respectfully requested to reconsider, and upon reconsideration to withdraw, the rejections of claims 1-26 and 28-39.

#### **Objection to Allowable Claim 27**

In the July 14, 2004 Office Action, the Examiner again objected to claim 27 for being dependent on a rejected base claim.

However, Applicants had already rewritten claim 27 in independent form in the Response to May 19, 2003 Office Action as transmitted to the Office by facsimile on November 18, 2003. In the Appeal Brief filed January 20, 2004, claim 27 was clearly presented in independent form.

Therefore, the Examiner's objection is apparently due to an oversight of the amendment of claim 27 in the November 18, 2003 Response and the corresponding presentation of claim 27 in independent form in the January 20, 2004 Appeal Brief.

**Request for One-Month Extension of Time under 37 C.F.R. §1.136(a) and Payment of Fee**

Applicants hereby request a one-month extension of time under 37 C.F.R. §1.136(a), which extends the time for responding to the July 14, 2004 Office Action to November 15, 2004.

The Office is hereby authorized to charge the \$110.00 fee to the credit card specified in the enclosed Credit Card Payment Form.

Further, the Office is authorized to charge any deficiency, or to credit any overpayment, associated with filing of this Response to Deposit Account No. 08-3284 of Intellectual Property/Technology Law.

**CONCLUSION**

Based on the foregoing, claims 1-39 as amended herein are patentably distinguished over the cited references, and in form and condition for allowance. Issue of a Notice of Allowance for the application is therefore requested.

If any issues remain outstanding, incident to the formal allowance of the application, the Examiner is requested to contact the undersigned attorney at (919) 419-9350 to discuss same, in order that this application may be allowed and passed to issue at an early date.

Respectfully submitted,



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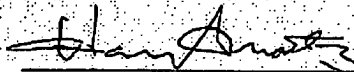
**BEFORE THE OFFICE OF ENROLLMENT AND DISCIPLINE  
UNITED STATES PATENT AND TRADEMARK OFFICE**

**LIMITED RECOGNITION UNDER 37 CFR § 11.9(b)**

Yongzhi Yang is hereby given limited recognition under 37 CFR § 11.9(b) as an employee of Intellectual Property Technology Law to prepare and prosecute patent applications wherein the patent applicant is the client of Intellectual Property Technology Law, and the attorney or agent of record in the applications is a registered practitioner who is a member of Intellectual Property Technology Law. This limited recognition shall expire on the date appearing below, or when whichever of the following events first occurs prior to the date appearing below: (i) Yongzhi Yang ceases to lawfully reside in the United States, (ii) Yongzhi Yang's employment with Intellectual Property Technology Law ceases or is terminated, or (iii) Yongzhi Yang ceases to remain or reside in the United States, authorized to be employed by an Employment Authorization Card issued pursuant to 8 CFR § 274a.12(c)(9).

This document constitutes proof of such recognition. The original of this document is on file in the Office of Enrollment and Discipline of the United States Patent and Trademark Office.

**Expires: August 10, 2005**



Harry L. Moatz  
Director of Enrollment and Discipline